

2 minute Warm-up!

1.  $\log_4 16$  2

2.  $\log_4 64$  3

3.  $\log_3 9$  2

4.  $\log_3 \frac{1}{3}$  -1

5.  $\log_2 32$  5

6.  $\log_2 4$  2

7.  $\log_5 \frac{1}{25}$  -2

8.  $6^{\log_6 32}$  32

9.  $\log_4 x < 2$   $4^2 > x$   
 $0 < x < 16$

10.  $\log_2 x > 3$   $2^3 < x$   
 $x > 8$

10-3  
Properties of Logs

$$\begin{array}{ll} b > 0 & b \neq 1 \\ m > 0 & n > 0 \end{array}$$

$$2^5 \cdot 2^7 = 2^{12}$$

1.  $\log_b m \cdot n = \log_b m + \log_b n$

2.  $\log_b m/n = \log_b m - \log_b n$

3.  $\log_b m^p = p \cdot \log_b m$

Simplify.

ex

$$\begin{aligned} & 2\log_{10} 5 + \log_{10} 4 \\ & \log_{10} 25 + \log_{10} 4 \\ & \log_{10} 100 \\ & \textcircled{2} \end{aligned}$$

ex

$$\begin{aligned} & 2\log_3 6 - \log_3 4 \\ & \log_3 36 - \log_3 4 \\ & \log_3 \frac{36}{4} \\ & \log_3 9 \\ & \textcircled{2} \end{aligned}$$

ex

$$\begin{aligned} & \log_4 40 - \log_4 5 = \textcircled{\frac{3}{2}} \\ & \log_4 8 = y \\ & 4^y = 8 \\ & 2^{2y} = 2^3 \\ & y = \frac{3}{2} \end{aligned}$$

ex

$$\log_4 3 - \log_4 48$$

$$\log_4 \frac{3}{48}$$

$$\log_4 \frac{1}{16}$$

$$-2$$

Expand

ex

$$\log_6 m^2 n^3$$

$$\log_6 m^2 + \log_6 n^3$$

$$2 \log_6 m + 3 \log_6 n$$

Expand

ex

$$\log_4 \sqrt{\frac{m}{n^5}}$$

$$\log_4 \left( \frac{m}{n^5} \right)^{\frac{1}{2}}$$

$$\frac{1}{2} \log_4 \frac{m}{n^5}$$

$$\frac{1}{2} (\log_4 m - 5 \log_4 n)$$

Solve.

ex

$$\log_5 x = 3 \log_5 2 + \log_5 7$$

$$\log_5 x = \log_5 8 + \log_5 7$$

$$\log_5 x = \log_5 56$$

$$x = 56$$

Solve.

ex

$$\log_3 x = 2 \log_3 3 + \log_3 5$$

$$x = 45$$

Solve.

ex

$$\log_b (x+3) = \log_b 8 - \log_b 2$$

$$x+3 = 4$$

$$x = 1$$

**Solve.**ex

$$\log_7(x+1) + \log_7(x-5) = 1$$

$$\log_7(x^2 - 4x - 5) = 1$$

$$7^1 = x^2 - 4x - 5$$

$$0 = x^2 - 4x - 12$$

$$0 = (x-6)(x+2)$$

$$x=6 \quad x=-2$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

ex

$$\log_3 54 \approx 3.6310$$

$$\log_3 3^3 \cdot 2$$

$$\log_3 3^3 + \log_3 2$$

$$3 + .6310$$

$$\begin{array}{c} 54 \\ \swarrow \searrow \\ 3 \quad 18 \\ \swarrow \searrow \quad \swarrow \searrow \\ 3^3 \cdot 2 \quad 3 \cdot 3 \end{array}$$

ex

$$\frac{1}{4}$$

$$\log_3 .25$$

$$\log_3 2^{-2}$$

$$-2(\log_3 2)$$

$$-2(.6310)$$

$$-1.2620$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

ex

$$\log_3 9/49$$

$$\log_3 \frac{9}{49}$$

$$\log_3 \left(\frac{3}{7}\right)^2$$

$$2 \log_3 \frac{3}{7}$$

$$2(\log_3 3 - \log_3 7)$$

$$2(1 - 1.7712)$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

ex

$$\log_3 7/2$$

$$\log_3 7 - \log_3 2$$

$$1.7712 - .6310$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

ex

$$\frac{18}{3^2 \cdot 2}$$

$$\log_3 18$$

$$\log_3 3^2 \cdot 2$$

$$\log_3 3^2 + \log_3 2$$

$$2 + .6310$$

$$2.6310$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

ex

$$\log_3 2/3$$

Given:

$$\log_3 7 \approx 1.7712$$

$$\log_3 2 \approx 0.6310$$

$$\log_3 3^p = p$$

HW

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